

# Package ‘DepMod’

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**Title** Decision-Analytic Modelling for Depression Prevention and Treatment

**Version** 0.1.0

**Description** Provides functions and example datasets to run a decision-analytic model for prevention and treatment strategies across depression severity states (sub-clinical, mild, moderate, severe, and recurrent). The package supports scenario analyses (base and alternative inputs) and summarises outcomes such as coverage, adherence, effect sizes, and healthcare costs.

**License** MIT + file LICENSE

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data_prev_rec_alt	<i>Intervention: prevention of recurrent depression (alternative)</i>
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**Description**

Alternative scenario intervention parameters for the prevention of recurrent depression. Structure matches the base dataset. Values can be adjusted to reflect alternative modelling assumptions. In this dataset, the same numbers are provided as in the base case.

**Usage**

```
data(data_prev_rec_alt)
```

**Format**

Same structure as data\_prev\_rec\_alt.

---

data_prev_rec_base	<i>Intervention: prevention of recurrent depression (base)</i>
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**Description**

Baseline intervention parameters for the prevention of recurrent depression among individuals with prior depressive episodes. Includes coverage, adherence, effect size, sample size, and healthcare costs.

**Usage**

```
data(data_prev_rec_base)
```

**Format**

Same structure as data\_prev\_sub\_base.

---

data\_prev\_sub\_alt      *Intervention: prevention of sub-clinical depression (alternative)*

---

### Description

This dataset contains alternative scenario intervention parameters for the prevention of sub-clinical depression in the DepMod model. The structure is identical to the base dataset but can represent alternative modelling assumptions. In this dataset, the same numbers are provided as in the base case.

### Usage

```
data(data_prev_sub_alt)
```

### Format

A data frame with the same columns as data\_prev\_sub\_alt.

---

data\_prev\_sub\_base      *Intervention: prevention of sub-clinical depression (base)*

---

### Description

This dataset contains baseline intervention parameters for the prevention of sub-clinical depression in the DepMod model. It includes coverage, adherence, effectiveness, sample size, and healthcare costs.

### Usage

```
data(data_prev_sub_base)
```

### Format

A data frame with one row per intervention strategy and columns:

**cov** Coverage of the intervention (proportion of target population).

**adh** Adherence to the intervention (proportion).

**1-RR** Effect size or relative risk reduction (numeric).

**n** Sample size or study population used for the parameter estimate.

**healthcare costs** Estimated healthcare costs per person.

### Details

Used to compute the overall preventive effect for sub-clinical depression in the simulation model.

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data_tr_mild_alt	<i>Intervention: treatment of mild depression (alternative)</i>
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## Description

Alternative scenario parameters for the treatment of mild depression. The structure matches the base dataset but values can be adjusted to reflect alternative modelling assumptions. In this dataset, the same numbers are provided as in the base case.

## Usage

```
data(data_tr_mild_alt)
```

## Format

Same structure as data\_tr\_mild\_base.

---

data_tr_mild_base	<i>Intervention: treatment of mild depression (base)</i>
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---

## Description

Baseline intervention parameters for the treatment of mild depression episodes. Includes coverage, adherence, effectiveness, sample size, and healthcare costs.

## Usage

```
data(data_tr_mild_base)
```

## Format

A data frame with one row per intervention strategy and columns:

- cov** Coverage of the intervention (proportion of mild cases).
- adh** Adherence to the intervention (proportion).
- d** Effect size or relative risk reduction (numeric).
- n** Sample size or study population used for the estimate.
- healthcare costs** Estimated healthcare costs per person.

---

*data\_tr\_mod\_alt*

*Intervention: treatment of moderate depression (alternative)*

---

### **Description**

Alternative scenario parameters for the treatment of moderate depression, structurally identical to the base dataset. Values can be adjusted to reflect alternative modelling assumptions. In this dataset, the same numbers are provided as in the base case.

### **Usage**

```
data(data_tr_mod_alt)
```

### **Format**

Same structure as *data\_tr\_mod\_base*.

---

*data\_tr\_mod\_base*

*Intervention: treatment of moderate depression (base)*

---

### **Description**

Baseline intervention parameters for the treatment of moderate depression episodes. Includes coverage, adherence, effect size, sample size, and healthcare costs.

### **Usage**

```
data(data_tr_mod_base)
```

### **Format**

Same structure as *data\_tr\_mild\_base*.

---

data\_tr\_sev\_alt

*Intervention: treatment of severe depression (alternative)*

---

### Description

Alternative intervention parameters for the treatment of severe depression episodes. Structure matches the base dataset. Values can be adjusted to reflect alternative modelling assumptions. In this dataset, the same numbers are provided as in the base case.

### Usage

```
data(data_tr_sev_alt)
```

### Format

Same structure as data\_tr\_sev\_alt.

---

data\_tr\_sev\_base

*Intervention: treatment of severe depression (base)*

---

### Description

Baseline intervention parameters for the treatment of severe depression episodes. Includes coverage, adherence, effectiveness, sample size, and healthcare costs.

### Usage

```
data(data_tr_sev_base)
```

### Format

Same structure as data\_tr\_sev\_base.

---

parameter_list	<i>Model parameters list</i>
----------------	------------------------------

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## Description

A named list of scalar parameters used in the disease progression and cost-effectiveness model. Each element is a single numeric value.

## Usage

```
data(parameter_list)
```

## Format

A named list with 40 elements:

**excess mortality** Excess mortality multiplier.

**retirement rate** Annual retirement rate.

**death rate** Baseline annual death rate.

**mean duration of chronicity (year)** Mean duration of chronic disease (years).

**increased relapse 1** Relapse multiplier for category 1.

**increased relapse 2** Relapse multiplier for category 2.

**increased relapse 3** Relapse multiplier for category 3.

**increased relapse 4** Relapse multiplier for category 4.

**increased relapse 5** Relapse multiplier for category 5.

**discount rate daly averted** Annual discount rate applied to DALYs averted.

**discount rate costs** Annual discount rate applied to costs.

**dw conversion factor** Disability weight conversion factor.

**Lower range dw conversion factor** Lower bound of the disability weight conversion factor.

**Upper range dw conversion factor** Upper bound of the disability weight conversion factor.

**Scale/shape Gamma cost distribution** Scale/shape parameter for a Gamma cost distribution.

**Incidence no history** Incidence among individuals with no prior history.

**pmild** Proportion of incident cases that are mild.

**pmoderate** Proportion of incident cases that are moderate.

**psevere** Proportion of incident cases that are severe.

**mildrecovery** Probability of full recovery from mild disease.

**mildpartial** Probability of partial recovery from mild disease.

**mildchronic** Probability of chronic course after mild disease.

**moderaterecovery** Probability of full recovery from moderate disease.

**moderatepartial** Probability of partial recovery from moderate disease.

**moderatechronic** Probability of chronic course after moderate disease.  
**severerecovery** Probability of full recovery from severe disease.  
**severepartial** Probability of partial recovery from severe disease.  
**severechronic** Probability of chronic course after severe disease.  
**mildrecoverycured** Among mild recoveries, probability of being cured.  
**mildrecoveryrelapse** Among mild recoveries, probability of relapse.  
**mildpartialcured** Among mild partial recoveries, probability of being cured.  
**mildpartialrelapse** Among mild partial recoveries, probability of relapse.  
**moderaterecoverycured** Among moderate recoveries, probability of being cured.  
**moderaterecoveryrelapse** Among moderate recoveries, probability of relapse.  
**moderatepartialcured** Among moderate partial recoveries, probability of being cured.  
**moderatepartialrelapse** Among moderate partial recoveries, probability of relapse.  
**severerecoverycured** Among severe recoveries, probability of being cured.  
**severerecoveryrelapse** Among severe recoveries, probability of relapse.  
**severepartialcured** Among severe partial recoveries, probability of being cured.  
**severepartialrelapse** Among severe partial recoveries, probability of relapse.

### Examples

```
data(parameter_list)
names(parameter_list)
parameter_list[["excess mortality"]]
```

---

run\_app

*Run the Shiny app*

---

### Description

Launches the Shiny app included in this package.

### Usage

```
run_app()
```

### Value

No return value; called for its side effect of launching the Shiny application.

### Examples

```
if (interactive()) {
  run_app()
}
```

---

run_model	<i>Run base and alternative simulation models</i>
-----------	---

---

## Description

Wrapper for running the DepMod decision-analytic model under both base and alternative scenarios. The function first builds the transition matrix using `func_first_part_model()` and then runs `fun_sim_model()` for each scenario.

## Usage

```
run_model(  
  parameters = parameter_list,  
  sim_runs = 1000,  
  total_population = 10518000,  
  df_prev_sub_base = data_prev_sub_base,  
  df_tr_mild_base = data_tr_mild_base,  
  df_tr_mod_base = data_tr_mod_base,  
  df_tr_sev_base = data_tr_sev_base,  
  df_prev_rec_base = data_prev_rec_base,  
  df_prev_sub_alt = data_prev_sub_alt,  
  df_tr_mild_alt = data_tr_mild_alt,  
  df_tr_mod_alt = data_tr_mod_alt,  
  df_tr_sev_alt = data_tr_sev_alt,  
  df_prev_rec_alt = data_prev_rec_alt  
)
```

## Arguments

`parameters`      Named list of model parameters (see Details).  
`sim_runs`      Integer. Number of simulation runs. Default is 1000.  
`total_population`      Integer. Total population size used in the simulation. Default is 10518000.  
`df_prev_sub_base`      Data frame for base scenario prevention (sub-clinical depression).  
`df_tr_mild_base`      Data frame for base scenario treatment (mild depression).  
`df_tr_mod_base`      Data frame for base scenario treatment (moderate depression).  
`df_tr_sev_base`      Data frame for base scenario treatment (severe depression).  
`df_prev_rec_base`      Data frame for base scenario prevention (recurrent depression).  
`df_prev_sub_alt`      Data frame for alternative scenario prevention (sub-clinical depression).  
`df_tr_mild_alt`      Data frame for alternative scenario treatment (mild depression).

**df\_tr\_mod\_alt** Data frame for alternative scenario treatment (moderate depression).  
**df\_tr\_sev\_alt** Data frame for alternative scenario treatment (severe depression).  
**df\_prev\_rec\_alt**  
 Data frame for alternative scenario prevention (recurrent depression).

## Details

The parameters list must contain numeric values controlling disease progression, recovery, relapse, disability weights, discounting, and cost accumulation. Required elements include:

### General simulation parameters

**dw\_conversion\_fact** Disability-weight conversion factor.  
**discount\_rate\_daly** Discount rate for DALYs.  
**scale\_shape\_gamma\_cost** Gamma distribution scale/shape cost factor.  
**disc\_rate\_cost** Discount rate for economic costs.  
**leavemodel** Probability of leaving the model.  
**mean\_dur\_chron** Mean duration of chronic phase.

### Population incidence inputs

**incidence\_no\_history** Incidence among individuals without prior disease.  
**pmild** Proportion of incident mild cases.  
**pmoderate** Proportion of incident moderate cases.  
**psevere** Proportion of incident severe cases.

### Stage-progression probabilities

**mildrecovery** Recovery probability from mild depression.  
**mildpartial** Partial remission probability (mild).  
**mildchronic** Chronic transition probability (mild).  
**moderaterecovery** Recovery probability (moderate).  
**moderatepartial** Partial remission probability (moderate).  
**moderatechronic** Chronic transition probability (moderate).  
**severerecovery** Recovery probability (severe).  
**severepartial** Partial remission probability (severe).  
**severechronic** Chronic transition probability (severe).

### Recovery-state outcomes

**mildrecoverycured** Cure probability from mild–recovery.  
**mildrecoveryrelapse** Relapse probability from mild–recovery.  
**mildpartialcured** Cure probability from mild–partial.  
**mildpartialrelapse** Relapse probability from mild–partial.  
**moderaterecoverycured** Cure probability from moderate–recovery.

**moderaterecoveryrelapse** Relapse probability from moderate–recovery.

**moderatepartialcured** Cure probability from moderate–partial.

**moderatepartialrelapse** Relapse probability from moderate–partial.

**severerecoverycured** Cure probability from severe–recovery.

**severerecoveryrelapse** Relapse probability from severe–recovery.

**severepartialcured** Cure probability from severe–partial.

**severepartialrelapse** Relapse probability from severe–partial.

### Relapse multipliers

**increased\_relapse\_1** Relapse multiplier (category 1).

**increased\_relapse\_2** Relapse multiplier (category 2).

**increased\_relapse\_3** Relapse multiplier (category 3).

**increased\_relapse\_4** Relapse multiplier (category 4).

**increased\_relapse\_5** Relapse multiplier (category 5).

### Value

A list with two elements:

**base** Model output using the base scenario.

**alt** Model output using the alternative scenario.

```
#' @examples res <- run_model()
```

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